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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/881,122	06/15/2001	Eberhard Pantow	016906-0220	7929

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EXAMINER
DUONG, THO V

ART UNIT	PAPER NUMBER
3743	

DATE MAILED: 12/05/2001

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/881,122	PANTOW ET AL.	
	Examiner	Art Unit	
	Tho V Duong	3743	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 June 2001 and 14 November 2001* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21* is/are pending in the application.

4a) Of the above claim(s) *17 and 21* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-16 and 18-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *15 June 2001* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Election/Restrictions

Claims 17 and 21 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected species, there being no allowable generic or linking claim. Election was made **without** traverse of species C in Paper No. 5.

Drawings

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the claimed subject matter of "a cooling loop carrying an engine coolant and communicating with the engine and a heat exchanger in the cooling loop" must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 6, 9 -11, 13-14 and 19-20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. As regards claim 6, the variable "C" is not disclosed in the elected species, it appears in figures 9 that variable "C'" has been used to indicate the distance between two vortex generator rows. As regards claim 9, the claimed subject matter of "...the distance, a, between the first flat face and the second flat face of the vortex generator rows..." is not shown in the elected figure. It

is also not clear how to define the dimension of "a" in the elected figures of 7 and 9. As regards claim 10, the claimed subject matter of "angle β of approximately 10 to 30" renders the scope of the claim indefinite since it is not clear this angle is formed with what axis or what direction. As regards claim 11, the claimed subject matter of "the flat tubes are beaded tubes, with a bead running parallel to the tube longitudinal axis" is not supported in the disclosure. As regards claims 13-14, the claimed subject matter of a cooling loop communicating with an engine and a heat exchanger is not shown in the drawings. As regards claims 19 and 20, the claimed subject matter of "the vortex generators in respective rows are arranged essentially in straight lines behind one another in the direction of the tube longitudinal axis" renders the scope of the claims indefinite since it is not clear how the vortex generator in each row (in transverse direction with longitudinal tube) can be arranged in straight lines behind one another in the longitudinal axis of the tube.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-5,8,12,14-16 and 19-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beck et al. (US 6,070,616) in view of Rhodes (US 4,470,452). Beck discloses (figures 1, 2 and column 20-22) a heat exchanger comprising a plurality of flat

tubes (10); elongated vortex generators (13,14) in the form of indentations pointing inward of at least one flat face of the flat tube wherein the vortex generators (13,14) which are adjacent transversely with respect to the tube longitudinal axis are inclined in opposite directions. Beck further discloses (column 2, line) that the vortex generator formed on both flat faces of the tube in several rows wherein respective vortex generator rows on the first flat face (11) and on the second flat face (12) are arranged in alternating relationship with respect to one another in the direction of the tube longitudinal axis. Beck further discloses (column 34-38) that a ratio between a height of the vortex generator and a height of the flat tube is a fourth (0.25, 25%) to a third (0.33, 33%). Basing on geometrical relationship shown in figure 2, Beck discloses an inclined angle of the vortex generators (13,14) is within 10 degrees to 40 degrees with respect to the tube longitudinal axis. Beck does not disclose the limitation that corrugated fins linked to the flat tubes and each row of vortex generators comprises of at least three vortex generators. Rhodes discloses (figures 1, 7C and column 3, lines 54-61) that a heat exchanger comprising of a plurality of flat tubes having rows of at least three vortex generators (152) run transversely with respect to the tube longitudinal axis in straight lines and corrugated fins (16) in contact with the tubes to increase heat transfer from a coolant flowing through the tubes per unit volume of the heat exchanger. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use Rhodes' teaching in Beck's device to increase heat transfer from a coolant flowing through the tubes per unit volume of the heat exchanger.

Claims 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beck and Rhodes as applied to claims 1, 5 above, and further in view of Damsohn et al. (US 6,321,835). Beck and Rhodes substantially disclose all of applicant's claimed invention as discussed above except for the limitation that the ratio distance between the rows in the direction of the tube longitudinal axis and the distance between the vortex generators to the length of the vortex generator are 1 to 10 and 0.1 to 0.9 respectively. Damsohn discloses (figures 5 and 7) that a heat exchanger that has a plurality of flat tubes (19) having a plurality of rows of vortex generators (23,24) wherein basing on geometrical relationship of figure 7, Damsohn discloses that the ratio distance between the rows and the length of the vortex generator is within the range 1-10 and the ratio distance between the vortex generators to the length of the vortex generator is within 0.1 to 0.9 to improve the heat transfer of the coolant flowing through the tubes. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use Damsohn's teaching in the combination device of Beck and Rhodes to improve heat transfer of a coolant flowing through the tubes.

Claims 10 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beck and Rhodes as applied to claims 8 and 16 above, and further in view of Imai Shuji (JP 359125395A). Beck and Rhodes substantially disclose all of applicant claimed invention as discussed above except for the limitation that the vortex generator rows are arranged at an angle β of 10 to 30 degrees. Imai discloses (figures 12 and 18) a heat exchanger that has a flat tube (5) having a plurality of vortex generator rows (2) formed on two flat faces of the tube wherein basing on geometrical relationship shown

in figures 12 and 18, the vortex generator rows are arranged at an angle within the range of 10 to 30 degrees with respect to a line transverse to the tube longitudinal axis to create a tortuous path of a coolant flow between the vortex generator in order to increase heat exchanging efficiency of the heat exchanger. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use Imai's teaching in the combination device of Beck and Rhodes to increase heat exchanging efficiency of the heat exchanger.

Conclusion

The non application of art against claims 9 and 11 should not be construed as an indication that the claims contains allowable subject matter.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Roberts (US 3,664,928) discloses a dimpled heat transfer wall that has vortex generator rows arranged at an angle.

Yamiya (JP 363017393A) discloses a heat exchanger that has projections formed on both faces of the tube and with a certain height ratio between the tube and the projections.

Sirovich et al. (US 5,833,389) discloses flat tubes with V-shaped projections formed on the tubes.

Karbach et al. (US 5,803,162) discloses a heat exchanger for motor vehicle that has vortex generators in V-shape.

Eric Smith (GB 2159265A) discloses heat exchanger that has flat tubes having a plurality of dimples formed on the tubes.

Any inquiry concerning this communication or earlier communication from the examiner should be directed to Tho Duong whose telephone number is (703)305-0768. The examiner can normally be reached on from 8:30 AM to 5 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Henry Bennet, can be reached on (703)308-0101. The fax phone number for the organization where this application or proceeding is assigned is (703)308-7764.

Any inquiry of a general nature or relating to status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0861.

Tho Duong

November 28, 2001.

Henry Bennett
Supervisory Patent Examiner
Group 3700